Learning Target: I can calculate the number of possible outcomes using a tree diagram or the Fundamental Counting Principal, determine if events are dependent or independent, and compute the probability of a compound event.

DEPENDENT & INDEPENDENT EVENTS

- Independent Event: the outcome of one event DOES NOT influence the outcome of a second event.
- Dependent Event: the outcome of one event DOES influence the outcome of a second event.

Examples:

1. Sam and Abby go to two different stores to pick out a candy bar. I - no influence on each other	2. Brian draws a card from a deck, sets it aside and draws a second card. D - can't pick same card twice
3. Joe and Michelle are choosing costumes from a trunk in their attic. Joe chooses first, then Michelle. D - Michelle & Joe can't pick same costume	4. Emily draws a marble from a large bag, puts it back, and chooses another marble. I - no influence on each other

COMPOUND EVENTS

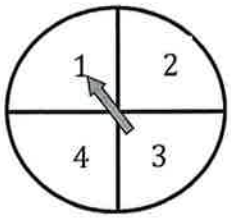
A compound event consists of two or more simple events. Determining the probability of compound events depends on the relationship between the events; whether or not they are independent or dependent events.

Independent Events

Events are independent when the outcome of one event does not affect the outcome of the other event.

Probability of Independent Events
$P(\text{A and B}) = P(\text{A}) \bullet P(\text{B})$

Example 1:



Two spinners are spun. What is the probability that both spinners will show an odd number?

$\frac{2}{4} \cdot \frac{4}{8} = \frac{8}{32} = \frac{1}{4}$ OR 25%

Steps
1) Find the probability of the first event.
2) Find the probability of the second event.
3) Multiply the probability of the first event, times the probability of the second event.
4) Simplify.

Example 2:

A card is drawn from a standard deck of cards and returned. A second card is drawn. What is the probability of drawing a red face card and then an ace?

$\frac{6}{52} \cdot \frac{4}{52} = \frac{24}{2704} = \frac{3}{338}$ OR 0.1%

Red Face cards — Aces

<u>Dependent Events</u>

Events are dependent when the outcome of one event depends on the outcome of another event.

Probability of Dependent Events
$P(\text{A and B}) = P(\text{A}) \cdot P(\text{B following A})$

Example 3:

There are 2 white, 8 red, and 5 blue marbles in a bag. Once a marble is selected it is not replaced.

a) Find the probability that two red marbles are chosen.

$P(\text{red and red}) = P(\text{red}) \cdot P(\text{Red} \mid \text{Red})$

$\frac{8}{15} \cdot \frac{7}{14} = \frac{56}{210} = \frac{4}{15}$ OR 27%

b) Find the probability a white marble, then a blue marble are chosen.

$\frac{2}{15} \cdot \frac{5}{14} = \frac{10}{210} = \frac{1}{21}$ OR 5%

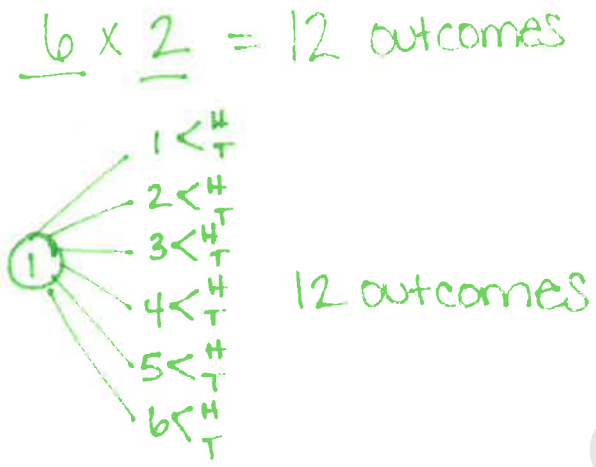
Steps
1) Find the probability of the first event.
2) Find the probability of the second event after the first event has occurred.
3) Multiply the probability of the first event, times the probability of the second event.
4) Simplify.

FUNDAMENTAL COUNTING PRINCIPAL

The **Fundamental Counting Principle** states that you can find the total number of outcomes for two or more experiments by multiplying the number of outcomes for each separate experiment. You can also use a **tree diagram** to illustrate possible arrangements of objects.

Example 4:

Antonio rolls a 1–6 number cube and then flips a coin. How many outcomes are possible?



Example 5:

Sarah picks a colored block from a bucket. There are 5 colors: red, yellow, green, purple and blue. She then replaces the block and chooses a second block. How many outcomes are in the sample space?